

*There is no end to scientific questions
that need answers . . .*

Guest Editorial

Superfund Basic Research: A State's Perspective on Health Effects Research Needs

Because the NIEHS is preparing to announce again the availability of funds for the Superfund Hazardous Substances Basic Research and Training Program (usually shortened to Superfund Basic Research Program), I would like to discuss some of the needs of states in regard to Superfund basic research, especially research that provides understanding and information on human health effects resulting from exposure to hazardous chemicals.

State health agencies differ in their role and involvement on hazardous waste sites. Some states play a very major role in writing and reviewing human health risk assessments for hazardous waste sites; some of them have only a very minor role, or no role at all. The collaboration between state health agencies and state environmental agencies varies from state to state, which again may influence the direct involvement.

State health agencies are always challenged to address either cancer clusters or other potential illnesses that the public perceives to be related directly to the exposure around a hazardous waste site. State health agencies also must address present health risks as well as adverse health effects that could result from proposed incinerators or low-level radioactive waste sites. All of these activities require the states to make decisions that are based on good health-based science.

What type of research is needed to better assist states in understanding the potential human health effects resulting from exposures to hazardous substances? First and foremost, it requires good quality research, peer-reviewed science. Only with good science are we able to make good decisions. Second, it is very important that the NIEHS funds for the Superfund Basic Research Program are earmarked and appropriated by Congress for a very specific purpose. It is extremely important not to lose sight of that purpose. Without a doubt, there is no end to scientific questions that need answers, but with the limited resources available, those resources need to be spent very selectively to result in the greatest cost-benefit relationship.

From a state perspective, this especially means that translational research should be a high priority of the Superfund Basic Research Program, particularly basic research that provides missing information to result in better risk assessments. This includes the Integrated Risk Information System (IRIS) database, a widely used database that provides values to be used in developing risk assessments. If risk assessors cannot find values such as reference doses, cancer potency factors, etc., in IRIS, there are a few additional resources that can be used, i.e., the Health Effects Assessment Summary Table (HEAST) or requests to the EPA National Center of Environmental Assessment. Some risk assessors may look up other values established by agencies such as the Occupational Safety and Health Administration, the National Institute for Occupational Safety and Health, or the Agency for Toxic Substances and Disease Registry (ATSDR), or if resources allow, the risk assessor can conduct a literature search and the respective state or local agency can develop their own risk values.

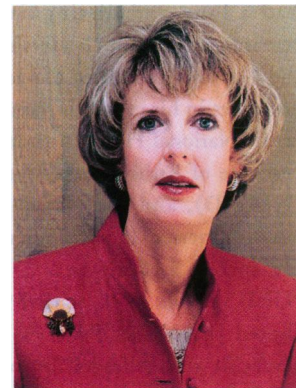
It would be very advantageous if research could be conducted specifically to fill some of the gaping holes of the IRIS database. In coordination with the EPA and the ATSDR, a list of chemicals of special interest on Superfund Sites has been produced. This list was included in the 1994 request for application that the NIEHS provided, and applicants were encouraged to include these chemicals in their application if and where appropriate to their individual research goals. It would be beneficial to point out what type of specific information on a chemical is missing, incomplete, or inconclusive, and encourage scientists to conduct research to aid in providing that information.

For example, there is currently very little information to estimate the risk of exposure to chemicals by inhalation. This type of information is nearly nonexistent in evaluating the risk to children. From a public health perspective, this is of great concern because it could mean that we are not conservative enough in evaluating this risk, which could result in a severe health impact as well as an economic impact by elevating health care costs in the future. It could also mean that we are too conservative in our estimation and are therefore imposing an economic burden on the responsible party for clean-up costs. Both scenarios are undesirable and present a burden to society. Therefore, there would be a great benefit in critically evaluating the scientific information that is available at this time and the lack of information that exists and setting priorities for the missing knowledge among the NIEHS, the EPA, the ATSDR, and other appropriate agencies.

Risk assessments following EPA guidelines have been conducted for several years now. Are those risk assessment models valid? Can they be improved? Are the uncertainties appropriate? These are all questions that require answers, and it is appropriate that they be investigated by this research program.

In addition, states may need answers to state-specific health questions. It would be helpful if there was a mechanism in place whereby states could request site-specific studies. At this time, this need is partially addressed by the ATSDR, through their site-specific public health assessments, health studies, and health consultations. However, very often those studies are inconclusive, they are not peer-reviewed, and they may pose more questions than answers. Research assistance in those studies or follow-up with more detailed basic research would make that process more beneficial.

Additional areas that should be emphasized in the NIEHS request for application are epidemiological studies or controlled clinical studies. These types of studies have great appeal and should be strongly considered. The shortcomings of these studies are overshadowed by



the greater acceptance of these kinds of studies by the nonscientific community. State health officials often have to explain to the public the type and severity of adverse health effects that could result from certain chemical exposures and the type of research upon which the information is based. The biggest challenge is still to link effects seen in the laboratory, e.g., in a Sprague Dawley rat or even in an *in vitro* liver cell line, to effects that could potentially be expected in humans. This should not, however, decrease the necessity and significance of laboratory research, but instead should suggest that controlled clinical studies or epidemiological studies be considered at the same time.

There are a few additional areas of research that are important in furthering our understanding of adverse health effects due to hazardous chemical exposure:

- Effects due to exposure to multiple related chemicals, especially those that occur, often simultaneously, around hazardous waste sites; these include carbon tetrachloride, chloroform, and other breakdown products, e.g., tetrachloroethylene, trichloroethylene, and additional dichloro compounds.

- Biological markers, an additional area of research that has some great appeal and should be pursued with great vigor.

- Low-level chronic exposure to hazardous chemicals. The need for such information is becoming more significant, especially since we are well aware of the hazards of spills and other incidences in which exposure occurred to a single chemical at a very high concentration. There usually is no hesitancy to recognize the potential health risk from such an exposure; however, long-term chronic exposure to low levels of contaminants is still a Pandora's box, and health professionals often lack sufficient information to make responsible decisions and give advice that protects public health.

Briefly, these are the areas of research for which additional answers would greatly benefit evaluation of health risks from toxic chemicals by state health officials.

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